

Consultation

Consultation on the Final Needs Case for the Hackney Waltham Cross Upgrade North London reinforcement project (North London project)

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We are consulting on our views on the Hackney Waltham Cross Upgrade North London reinforcement project – (North London project). We would like views from people with an interest in new transmission infrastructure, meeting the net zero challenge, and competition in onshore transmission networks. We particularly welcome responses from consumer groups, stakeholders impacted by the project, stakeholders with an interest in the costs of electricity transmission infrastructure, and Transmission Owners (TOs). We would also welcome responses from other stakeholders and the public.

This document outlines the scope, purpose, and questions of the consultation and how you can get involved. Once the consultation is closed, we will consider all responses. We want National Grid Electricity Transmission plc (NGET) be transparent in our consultations. We will publish the non-confidential responses we receive alongside a decision on next steps on our website at [ofgem.gov.uk/consultations](https://www.ofgem.gov.uk/consultations). If you want your response – in whole or in part – to be considered confidential, please tell us in your response and explain why. Please clearly mark the parts of your response that you consider to be confidential, and if possible, put the confidential material in separate appendices to your response.

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Executive Summary

Hackney Waltham Cross Upgrade North London reinforcement project and what this document covers.

In May 2022, National Grid Electricity Transmission plc (NGET), who own and operate the transmission network in England and Wales, submitted to Ofgem an Eligibility to Apply letter, regarding the proposed Hackney Waltham Cross Upgrade North London reinforcement project (North London project).

In its Eligibility to Apply letter NGET flagged that the North London project has obtained all material planning consent. Following the letter and consideration of the planning consent status, in July 2022 we published a direction¹ that relieved NGET of the requirement to submit an Initial Needs Case (INC) and allowed NGET to proceed with the Final Needs Case (FNC) submission.

In November 2022 we received a FNC submission from NGET in line with Part F of Special Condition 3.13 of their electricity transmission licence.

North London reinforcement is an electricity transmission project to construct:

- Uprating from 275kV to 400kV of 19.5km of the ZBC and VC overhead line (OHL) routes (between Hackney, Tottenham and Waltham Cross substations), with a new 10 bay 400kV Gas Insulated Substation (GIS) at Waltham Cross, two new Super Grid Transformers (SGTs) at Brimsdown, two new SGTs at Hackney and cable bypass at Tottenham;
- Reconductoring of the 29km route between Pelham –Rye House and Waltham Cross, and the installation of power flow control at Pelham in the form of 2 x quadrature boosters (QB); and
- Refurbishment of 13.5km of the ZBD OHL route (between Tottenham and Waltham Cross substations).

The project is triggered by the need to provide reinforcement of the route between Pelham and Hackney substations to accommodate increases in future renewable generation. Without reinforcement, the current 275kV circuits feeding London would be overloaded by high levels of offshore wind from East Anglia. This would be worsened where high wind generation coincides with high levels of interconnector exports from

¹ [Direction for the Hackney Waltham Cross Upgrade North London reinforcement project | Ofgem](#)

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locations south of London. **Figure 1** shows a map of South east England, the relevant boundaries in this area and the respective location of the project (named here as HWUP). **Figure 2** shows a Close-up of the London Network and key reinforcement projects.

Figure 1: location of the North London project

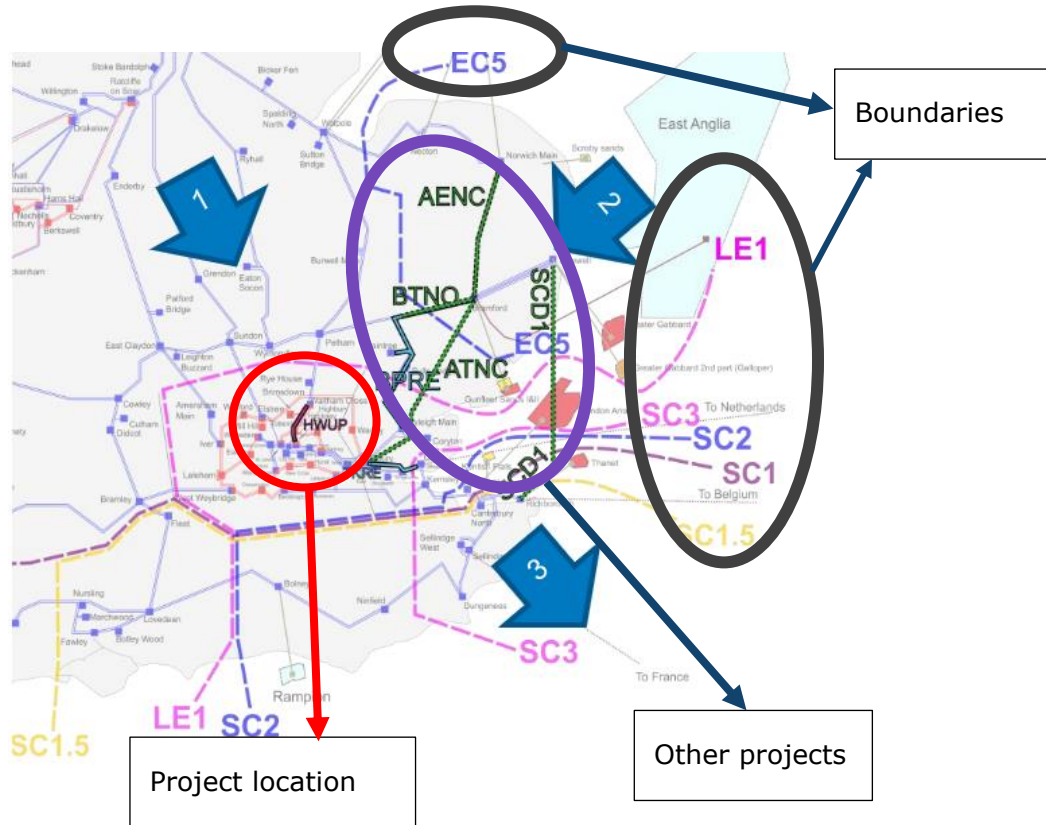
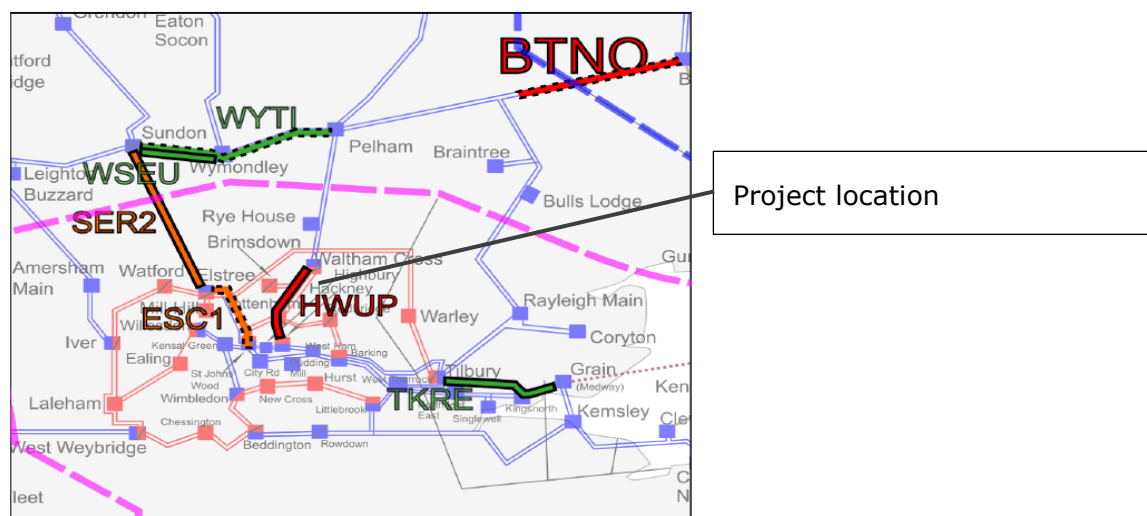


Figure 2: Close-up of the London Network and key reinforcement projects.



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This project appears as a 'Holistic Network Design (HND) critical' reinforcement in the July 2022 Network Options Assessment (NOA)² Refresh carried out by National Grid Electricity System Operator (ESO).

In accordance with our RIIO-2 price control arrangements, we have been assessing the need for the proposed project under our Large Onshore Transmission Investment (LOTI) re-opener mechanism³ and its suitability for applying a competition model.

This consultation seeks stakeholder views on our assessment of the FNC for the North London project. The FNC stage is intended to provide clarity for NGET and wider stakeholders on our view on the progress of the project to-date. It also sets out our thoughts on the suitability of applying a late competition model to the project.

² [Network Options Assessment \(NOA\) | ESO \(nationalgrideso.com\)](#)

³ [Special condition 3.13 of the Electricity Transmission licence](#) and the [LOTI Guidance](#)

Final Needs Case Assessment

In the November FNC submission, NGET has made a clear needs case for the North London project. In our view, NGET has made the case that reinforcement of the route between Pelham and Hackney substations will accommodate increases in future renewable generation. We agree that otherwise the current 275kV circuits feeding London would be overloaded by high levels of offshore wind from East Anglia. This would be worsened under export conditions where high wind generation coincides with high levels of interconnector exports from locations south of London.

We are satisfied that NGET considered a range of appropriate options and that their preferred option: HWUP, is the optimal solution. Our reasons are set in Chapter 2 of this document.

The cost estimate of the project used in the cost benefit analysis (CBA) was £289.4m (2021/22 prices). We consider that the CBA undertaken by the ESO for NGET to support the FNC submission is robust and supports the need for the project. We are satisfied that the CBA results show that NGET's preferred option 1 (also known as HWUP), is the optimal option in comparison to the other options considered.

We note that this is partly due to the Earliest In Service date (EISD)⁴ being sooner (2027) than some alternative options (3, 6 with EISD of 2029 and 2031 respectively) and partly because of the higher benefits this option brings relative to other options delivered in similar EISDs (options 2, 4, 5, 7). We therefore expect NGET to continue progressing the North London project in a timely manner to ensure that the benefits are fully realised.

In December 2022 we published our decision on Accelerating Strategic Transmission Investment (ASTI).⁵ This decision sets out how we will support the accelerated delivery of strategically important electricity transmission upgrades that are needed to meet the Government's 2030 renewable electricity generation ambitions. This included steps we will take to streamline the regulatory approval process for qualifying projects by providing early funding certainty and reducing the number of regulatory approval stages. It also includes the exemption of the projects from consideration for delivery via a competition model. The North London project is one of the projects that we have

⁴ This is the term used to show the earliest year a network reinforcement option can be feasibly delivered

⁵ [Decision on accelerating onshore electricity transmission investment | Ofgem](#)

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included in the ASTI framework.⁶ We are planning to implement the changes explained in our ASTI decision into TO's licences later this year. Until that time, we will continue our assessment of this project under the existing LOTI mechanism.

Under the LOTI mechanism NGET is required⁷ to secure all material planning consents before submitting a FNC unless we direct otherwise. A Development Consent Order (DCO) and all material consent had been acquired in 2014. We therefore issued a direction⁸ to relieve NGET of the requirement to submit an INC in July 2022.

Delivery via a competition model

North London is currently being considered under the LOTI mechanism in line with our Final Determinations for the RIIO-2 period for Electricity Transmission.⁹ Under the LOTI mechanism, we typically assess the suitability of the project for 'late model' competition.¹⁰ Although it is planned that North London will be subject to the ASTI arrangements, until those are in place in NGET's licence, we must continue to assess it under the LOTI mechanism.

Most of the project meets the criteria for late model competition and could be separated from other elements of the project, that do not meet the criteria, into a 'repackaged' project that could be considered for late model competition. This is in line with the ESO view as per their published NOA 2021/22 Refresh. The approach also aligns with our own principles for 'project packaging' as set out in previous competition policy decisions.¹¹

However, from our assessment under the LOTI mechanism, we would not be able to implement either the Competitively Appointed Transmission Owner's (CATO) or the Special Purpose Vehicle's (SPV) model for this project without causing delay. This is

⁶ Referred to as "HWUP" in the ASTI decision document: [Decision on accelerating onshore electricity transmission investment](#)

⁷ [Decision on the proposed modifications to the RIIO-2 Transmission, Gas Distribution and Electricity System Operator licence conditions - 1 April 2022](#), special condition 3.13.14 of NGET's electricity transmission licence

⁸ [Direction for the Hackney Waltham Cross Upgrade North London reinforcement project | Ofgem](#)

⁹ [RIIO-2 Final Determinations for Transmission and Gas Distribution network companies and the Electricity System Operator | Ofgem](#)

¹⁰ 'Late model' competition refers to the late models of competition identified for consideration for LOTI projects within the RIIO-2 Period (the Competitively Appointed Transmission Owner (CATO) model, the Special Purpose Vehicle (SPV) model, and the Competition Proxy Model (CPM)) as explained in the [RIIO-2 Final Determinations](#), Core Document (REVISED), chapter 9

¹¹ [OfgemExternalPublication2015](#) - appendix 4 of this doc sets out the principles for project packaging, but a couple of things to note: (i) this is from 5 years ago and work on late competition pretty much ceased at that point so I'm not sure how final any of this is, and (ii) there is no legislation in place that enables competitive tendering of onshore transmission infrastructure so no real prospect of competing this regardless of how it's packaged.

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particularly pertinent given that the CBA indicates that a one-year delay to NGET's preferred option, HWUP, would cost consumers up to £132m in constraint costs.

The outcome under the LOTI regime is consistent with the position if North London is considered under the planned ASTI arrangements because, as part of our ASTI decision we confirmed that all projects included in the arrangements will be exempt from consideration for delivery via a model of competition. Therefore, under either the LOTI mechanism, or the ASTI arrangements, North London will not be subject to competition.

Large project delivery (LPD)

North London is currently being considered under the LOTI mechanism in line with our Final Determinations for the RIIO-2 period for electricity transmission. Under the LOTI mechanism, we typically assess the approach to late delivery of large projects.¹² However, it is intended that North London will be transitioned from being considered under the LOTI mechanism to be considered under ASTI arrangements when they are in place.

Our view is that there is a need to protect the interests of existing and future consumers from the impact of project delivery delay for North London because such a delay may lead to significant additional constraint costs. As such, if the project remained under LOTI, we would consider the application of a Project Delivery Charge (PDC) to the project at the Project Assessment Stage. However, under the ASTI regime, we will instead apply an Output Delivery Incentive (ODI)¹³ that rewards/penalises the TOs for delivery against target delivery dates.

Next Steps

We welcome responses to our consultation on the specific questions we have included in Chapters 2, 3, and 4. If you would like to respond to this document then please send your responses to: RIIOElectricityTransmission@ofgem.gov.uk. The deadline for responses is 16th June 2023. We plan to publish our decision on the FNC for the North London project in Summer 2023, following review of the responses to this consultation.

¹² [RIIO-2 Final Determinations](#), ET Annex (REVISED), page 32 onwards

¹³ [Decision on accelerating onshore electricity transmission investment](#), chapter 7, table 10. Please note that the North London project is listed as project HWUP

1. Introduction

What are we consulting on?

- 1.1 As set out in section 5.1 of the LOTI Guidance, the purposes of an FNC stage is to review the progression and changes to the project since the INC and reach a final view on whether the project as proposed by NGET is needed. However, the North London project was not reviewed as an INC. We relieved NGET from submitting an INC¹⁴ as the project had all material planning consent in place. We therefore used this FNC review to assess the need for the project, as well as to understand and assess the evidence used, and the process followed, by the TO in reaching its favoured technical solution.
- 1.2 The main constrained boundaries this project aims to alleviate are: EC5 in the second half of the 2020's and LE1 from the mid-2020's out into the future. These are boundaries illustrated in Figure 1 above, in south-east Anglia that are forecast to be heavily constrained due to (i) increased north to south power flows;(ii) increased quantity of electricity from offshore wind connecting to East Anglia coastline; and (iii) increasing quantity of electricity that is exported to mainland Europe via interconnectors.

Chapter 2: North London Final Needs Case assessment

Chapter 2 summarises our findings on the FNC for this project, the conclusions of our assessment, and our proposed position. Our questions are:

- Q1: Do you agree with the technical need for investment on the transmission network?
- Q2: Do you agree with our conclusions on the technical options considered?
- Q3: Do you agree with our conclusions on the CBA and the appropriateness of the proposed option taken forward?

Chapter 3: Delivery model considerations

Chapter 3 summarises our proposed position on whether the project meets the criteria for late competition and whether it should be funded through a late competition model.

¹⁴ [Direction for the Hackney Waltham Cross Upgrade North London reinforcement project | Ofgem](#)

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Chapter 4: Large project delivery

Chapter 4 summarises the LPD funding mechanism and our proposed view of its applicability to the project.

Chapter 5: Next steps

Chapter 5 summarises our expectation for the next stages of assessment.

Context

- 1.3 The Great Britain's (GB) onshore electricity transmission network is currently planned, constructed, owned, and operated by three TOs: National Grid Electricity Transmission (NGET) in England and Wales, Scottish Power Transmission (SPT) in the south of Scotland, and Scottish Hydro Electric Transmission (SHET) in the north of Scotland. We regulate these TOs through the RIIO (Revenue = Incentives + Innovation + Outputs) price control framework. For offshore transmission, we appoint Offshore Transmission Owners (OFTOs) using competitive tenders.
- 1.4 The incumbent onshore TOs are currently regulated under the RIIO-2 price control, which started on 1 April 2021 and will run for 5 years. Under this price control, we developed a mechanism for assessing the need for, and efficient cost of, large and uncertain electricity transmission reinforcement projects. This mechanism is called 'Large Onshore Transmission Investment' (LOTI). Once the need for and costs of projects have become more certain, the TOs will submit construction proposals and seek funding for them. As explained in chapter 9 of the RIIO-2 Final proposals – Core Document (REVISED),¹⁵ all projects that come forward for assessment via the LOTI re-opener mechanism during the RIIO-2 period will be considered for their suitability for delivery through one of the late competition models.
- 1.5 Network investment is informed by the Future Energy Scenarios (FES),¹⁶ and the NOA¹⁷, which are developed and published annually by the ESO. A key focus of the FES 2020 is the inclusion of the legally binding¹⁸ UK Government Net Zero

¹⁵ [RIIO-2 Final Determinations](#), Core Document (REVISED), chapter 9

¹⁶ ESO [Future Energy Scenarios \(FES\)](#)

¹⁷ ESO [Network Option Assessment \(NOA\)](#)

¹⁸ [The Climate Change Act 2008 \(2050 Target Amendment\) Order 2019](#)

targets, to be achieved by 2050. The transition to a Net Zero economy will see increased demand on transmission boundary capability which needs to be facilitated by critical network reinforcements.

- 1.6 Our assessment and proposed position set out in this document are subject to consultation and we invite stakeholders to respond using the contact details set out on the front of this document. We have indicated questions for stakeholders at the start of each chapter where relevant.

Overview of LOTI re-opener mechanism

- 1.7 The LOTI re-opener mechanism is set out in Special Condition 3.13 of electricity transmission licence and associated LOTI guidance. It provides TOs with a route to apply for funding for large investment projects that can be shown to deliver benefits to consumers, but that were uncertain or not sufficiently developed at the time we set costs and outputs for the RIIO-2 price control period. The LOTI mechanism provides a robust assessment process through which we can ensure that TO proposals represent value for money for existing and future consumers.
- 1.8 To qualify for the LOTI mechanism, TO proposals must meet the definition of LOTI as set out in the electricity transmission licence:
- a) be expected to cost £100m or more of capital expenditure; and
 - b) be, in whole or in part, load related.¹⁹
- 1.9 We are satisfied that the North London project meets these criteria and is therefore eligible as a LOTI project. We are therefore assessing the North London project in accordance with the LOTI mechanism as detailed in the LOTI Guidance.²⁰

¹⁹ Part (b) of this criterion used to be either "wholly or partly load related" or "shared-use or sole-use generator connection project related". As a result of a licence modification, which came into effect on 24 July 2021, the "shared-use or sole-use generator connection project" criterion no longer applies. The LOTI guidance has not been updated at paragraph 3.1 to reflect this, however, this does not impact the project as this is in part a load related project. For further information on the licence modification, see the [Decision on the proposed modifications to the RIIO-2 Transmission, Gas Distribution and Electricity System Operator licence conditions](#)

²⁰ [Large Onshore Transmission Investments \(LOTI\) Re-opener Guidance | Ofgem](#)

General stages of our LOTI assessment

1.10 Following the approval of eligibility, the LOTI mechanism is normally made up of three main stages:

1. **Initial Needs Case (INC)** – The usual focus of our assessment at this stage is to review the technical and/or economic need for the project, the technical options under consideration, and the TOs justification for taking forward its preferred option for further development.

2. **Final Needs Case (FNC)** – Following the securing of all material planning consents for the project, the TO will then need to submit a FNC (unless we specify alternative timing). The focus of our assessment at this stage is to confirm the need for the project by checking that there have been no material changes in technical and/or economic drivers that were established in the INC.

3. **Project Assessment (PA)** – If the FNC is approved, the TO will then need to apply for a PA direction. The focus of our assessment at this stage is the assessment of the proposed costs and delivery plan that the TO has in place for the project, with a view to potentially specifying in the TOs licence a new LOTI Output, a LOTI Delivery date, and setting the efficient cost allowances that can be recovered from consumers for delivery of the project.

Related publications

- 1.11 RIIO-2 Final Determinations – Core Document and NGET Annex – both REVISED: [Ofgem.gov.uk/publications-and-updates/riio-2-final-determinations-transmission-and-gas-distribution-network-companies-and-electricity-system-operator](https://www.ofgem.gov.uk/publications-and-updates/riio-2-final-determinations-transmission-and-gas-distribution-network-companies-and-electricity-system-operator)
- 1.12 LOTI Re-opener Guidance document: [Ofgem.gov.uk/publications-and-updates/large-onshore-transmission-investments-loti-re-opener-guidance](https://www.ofgem.gov.uk/publications-and-updates/large-onshore-transmission-investments-loti-re-opener-guidance)
- 1.13 Decision on Accelerating Strategically Important onshore electricity Transmission Investment (ASTI): [Decision on accelerating onshore electricity transmission investment | Ofgem](https://www.ofgem.gov.uk/decision-on-accelerating-onshore-electricity-transmission-investment)

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Consultation stages

Stage 1	Stage 2	Stage 3	Stage 4
Consultation open	Consultation closes (awaiting decision). Deadline for responses	Responses reviewed	Consultation decision/policy statement
12/05/2023	16/05/2023	05/2023	06/2023

How to respond

- 1.14 We want to hear from anyone interested in this consultation. Please send your response to the person or team named on this document's front page.
- 1.15 We've asked for your feedback in each of the questions throughout. Please respond to each one as fully as you can.
- 1.16 We will publish non-confidential responses on our website at www.ofgem.gov.uk/consultations.

Your response, data and confidentiality

- 1.17 You can ask us to keep your response, or parts of your response, confidential. We'll respect this, subject to obligations to disclose information, for example, under the Freedom of Information Act 2000, the Environmental Information Regulations 2004, statutory directions, court orders, government regulations or where you give us explicit permission to disclose. If you do want us to keep your response confidential, please clearly mark this on your response and explain why.
- 1.18 If you wish us to keep part of your response confidential, please clearly mark those parts of your response that you *do* wish to be kept confidential and those that you *do not* wish to be kept confidential. Please put the confidential material in a separate appendix to your response. If necessary, we'll get in touch with you to discuss which parts of the information in your response should be kept confidential, and which can be published. We might ask for reasons why.
- 1.19 If the information you give in your response contains personal data under the General Data Protection Regulation (Regulation (EU) 2016/679) as retained in domestic law following the UK's withdrawal from the European Union (UK GDPR), the Gas and Electricity Markets Authority will be the data controller for the

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purposes of GDPR. Ofgem uses the information in responses in performing its statutory functions and in accordance with section 105 of the Utilities Act 2000. Please refer to our Privacy Notice on consultations, see appendix 1.

- 1.20 If you wish to respond confidentially, we'll keep your response itself confidential, but we will publish the number (but not the names) of confidential responses we receive. We won't link responses to respondents if we publish a summary of responses, and we will evaluate each response on its own merits without undermining your right to confidentiality.

General feedback

- 1.21 We believe that consultation is at the heart of good policy development. We welcome any comments about how we've run this consultation. We'd also like to get your answers to these questions:

- 1) Do you have any comments about the overall process of this consultation?
- 2) Do you have any comments about its tone and content?
- 3) Was it easy to read and understand? Or could it have been better written?
- 4) Were its conclusions balanced?
- 5) Did it make reasoned recommendations for improvement?
- 6) Any further comments?

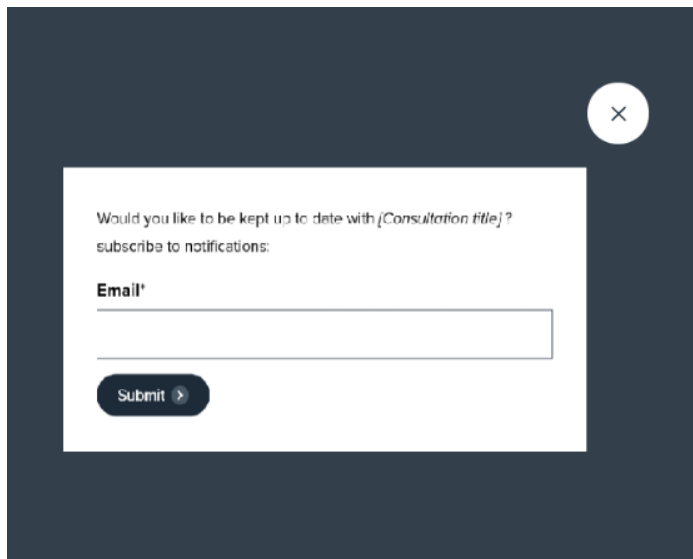
- 1.22 Please send any general feedback comments to stakeholders@ofgem.gov.uk

How to track the progress of the consultation

- 1.23 You can track the progress of a consultation from upcoming to decision status using the 'notify me' function on a consultation page when published on our website. [Ofgem.gov.uk/consultations](https://www.ofgem.gov.uk/consultations)

Notify me +

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A screenshot of a dark-themed modal window. In the top right corner, there is a white circular button with a black 'X' icon. The main content area is white and contains the following text: "Would you like to be kept up to date with [Consultation title]?" followed by "subscribe to notifications:". Below this is a label "Email:" and a text input field. At the bottom left of the form is a dark rounded button with the text "Submit" and a right-pointing arrow.

- 1.24 Once subscribed to the notifications for a particular consultation, you will receive an email to notify you when it has changed status. Our consultation stages are:
- 1.25 **Upcoming** > **Open** > **Closed** (awaiting decision) > **Closed** (with decision)

2. North London Final Needs Case assessment

Section summary

This chapter sets out the key decisions NGET has made to date on the North London project. It also describes our assessment of this approach and explains our findings on the technical need, options, and CBA for the project.

Questions

- Q1. Do you agree with the technical need for investment on the transmission network?
- Q2. Do you agree with our conclusions on the technical options considered?
- Q3. Do you agree with our conclusions on the CBA and the appropriateness of the option taken forward?

Overview of NGET's proposal

- 2.1 In July 2022 Ofgem published a direction²¹ that relieved NGET of the requirement to submit an INC for the North London project and allowed NGET to proceed with the FNC submission.
- 2.2 The FNC for the North London project was submitted by NGET in November 2022. It is supported by a CBA carried out by the ESO, as well as recommendations to proceed from the annual NOA²² process and the HND report.²³ The NOA code for the preferred option for the project is HWUP.
- 2.3 NGET proposes to reinforce the route between Pelham and Hackney substation to facilitate anticipated increase in North to South power transfers due to the proposed renewable power generation in Scotland and Offshore wind connecting in East Anglia coastline. Additionally, several new interconnectors to Europe in the south-east coastal areas of England will lead to significant power flows through the existing 275kV London network into south-east England especially at times of high wind generation and high export to Europe via interconnectors. The

²¹ [Direction for the Hackney Waltham Cross Upgrade North London reinforcement project | Ofgem](#)

²² [Network Options Assessment \(NOA\) | ESO \(nationalgrideso.com\)](#)

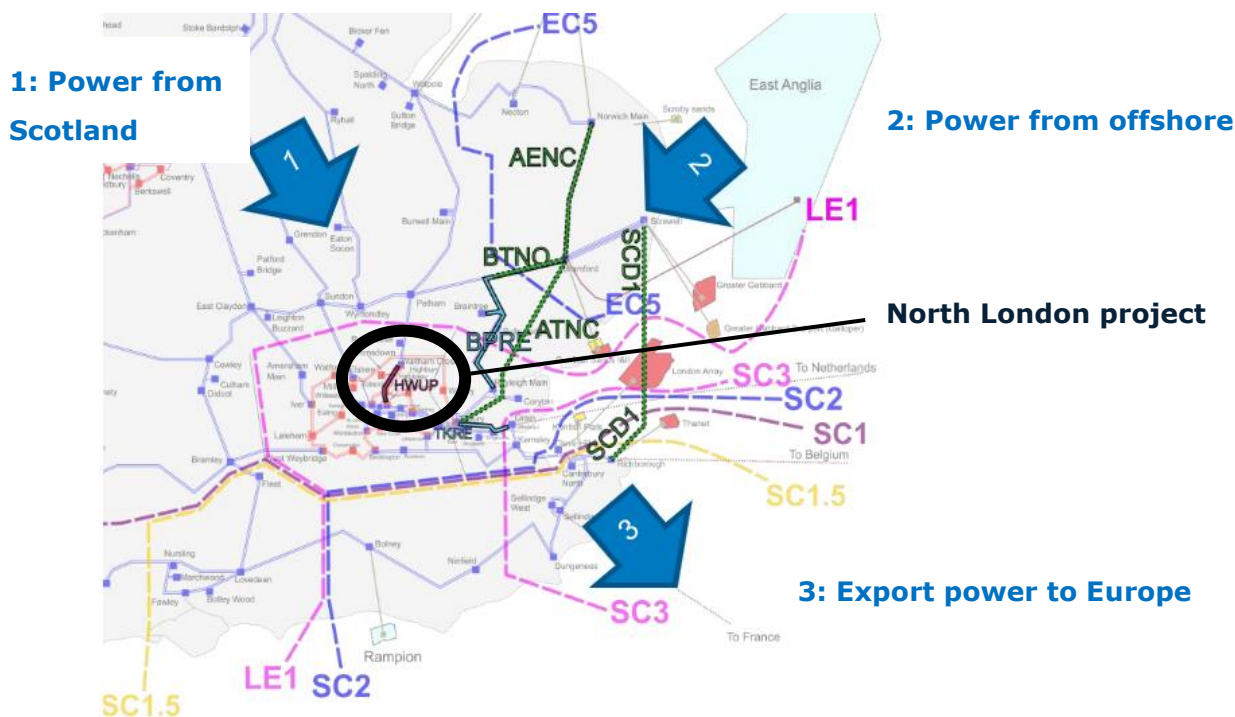
²³ HWUP appears as a recommended onshore works for the East Cost Region in the HND report which can be found here: [The Pathway to 2030 Holistic Network Design | ESO \(nationalgrideso.com\)](#)

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constraint boundaries will be EC5 (bordering east Anglia) and LE1 (around London and the south-east), and SC1 (running parallel with the south coast)

- 2.4 **Figure 3** shows the location of the project, the respective boundaries and the additional power flows expected in the area:

Figure 3: project location, respective boundaries and expected power flows.

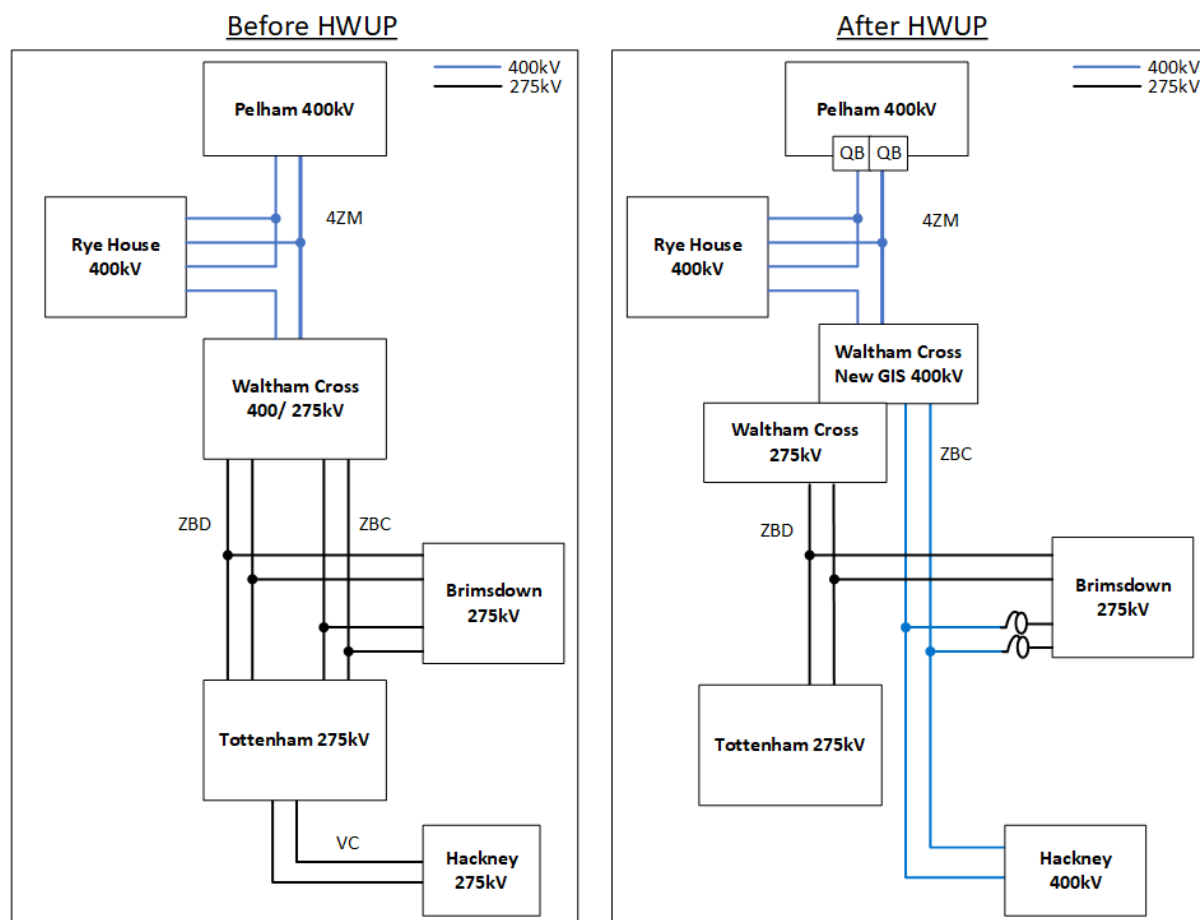


- 2.5 **Figure 4** presents the project's scope of work, consisting of:

- Upgrading from 275kV to 400kV of 19.5km of the ZBC and VC OHL routes (between Hackney, Tottenham and Waltham Cross substations), with a new 10 bay 400kV GIS substation at Waltham Cross, two new SGTs at Brimsdown, two new SGTs at Hackney and cable bypass at Tottenham; and
- Reconductoring of the 29km route between Pelham – Rye House and Waltham Cross, and the installation of power flow control at Pelham in the form of 2 x quadrature boosters (QB).

- 2.6 NGET also included in their submission proposal to refurbish 13.5km of the ZBD OHL route (between Tottenham and Waltham Cross substations); This work however does not provide any additional capability and is driven by the condition of the OHL route. It was therefore not included in the CBA, as it is funded under NGET's baseline.

Figure 4: Scope of preferred option, HWUP, for North London



Why the project has been brought forward.

2.7 Under all the ESO's 2022 Future Energy Scenarios (FES), a large amount of new offshore wind generation is planned in East Anglia, with the generation in this area set to significantly exceed the local demand. For example, the ESO's Electricity Ten Year Statement (ETYS) 2022²⁴ flags that currently, there is a total of 8GW transmission-connected generation in the region. This is forecast to increase across all of four FES scenarios to between 18-21GW by 2030. ETYS shows that most of this increase is driven by growth in low carbon generation

²⁴ See full ETYS publication, page 44 here: [Electricity Ten Year Statement \(ETYS\) | ESO \(nationalgrideso.com\)](https://www.nationalgrideso.com)

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- projects (mainly offshore wind) connecting across the region, which is expected to increase from 5.5GW today to over 13GW by 2030 across all FES scenarios.
- 2.8 Peak gross demand in the East of England region is expected to remain steady or potentially rise by up to 1GW. The excess power from this area will flow south to serve the demand centre in the London region, which is served by a mainly 275kV network.
- 2.9 Several new interconnectors to Europe in the south-east coastal areas of England with a total capacity of >11GW are also expected above the existing 6GW already connected. This will lead to significant power flows through the 275kV London network into south-east England, particularly at times when there is high wind generation and high export to Europe via interconnectors.
- 2.10 Under these conditions the northern 275kV circuits feeding London will be thermally overloaded and constrained. The constrained boundaries identified are EC5 (bordering East Anglia), LE1 (around London and the South East) and SC1 (running parallel with the south coast).
- 2.11 Without reinforcement, The ESO will be required to take constraint action²⁵ to maintain secure and safe system operation. Such action from the ESO would result in costs which ultimately feed into consumers' bills.
- 2.12 On top of the increase in consumers bills, there is an additional risk to the environment: in a case of high demand that can't be met by renewable generation due to the constraint boundary, that demand will have to be met by additional non-renewable generation such as coal or gas,²⁶ which will increase emissions of greenhouse gas.
- 2.13 The ETYS and the NOA refresh published alongside HND have shown the need for investment across multiple transmission boundaries of the GB network.²⁷

²⁵ When transmission capability is insufficient to support required electricity flow, this is known as a constraint. The ESO manages these constraints by taking actions - by paying generators (or demand) in different locations to change their output (or consumption), thus changing the flow on the network. The amount the ESO pays network users to manage constraints in this way is known as the constraint cost.

²⁶ In the absence of other means, the ESO will ask power stations – coal or gas – to power up to meet demand.

²⁷ [Electricity Ten Year Statement](#) (ETYS) is the ESO's view of future transmission requirements and the capability of Great Britain's National Electricity Transmission System over the next decade; and the [Network Option Assessment](#) (NOA) provides the ESO's recommendation for which network reinforcement projects should receive investment, and when

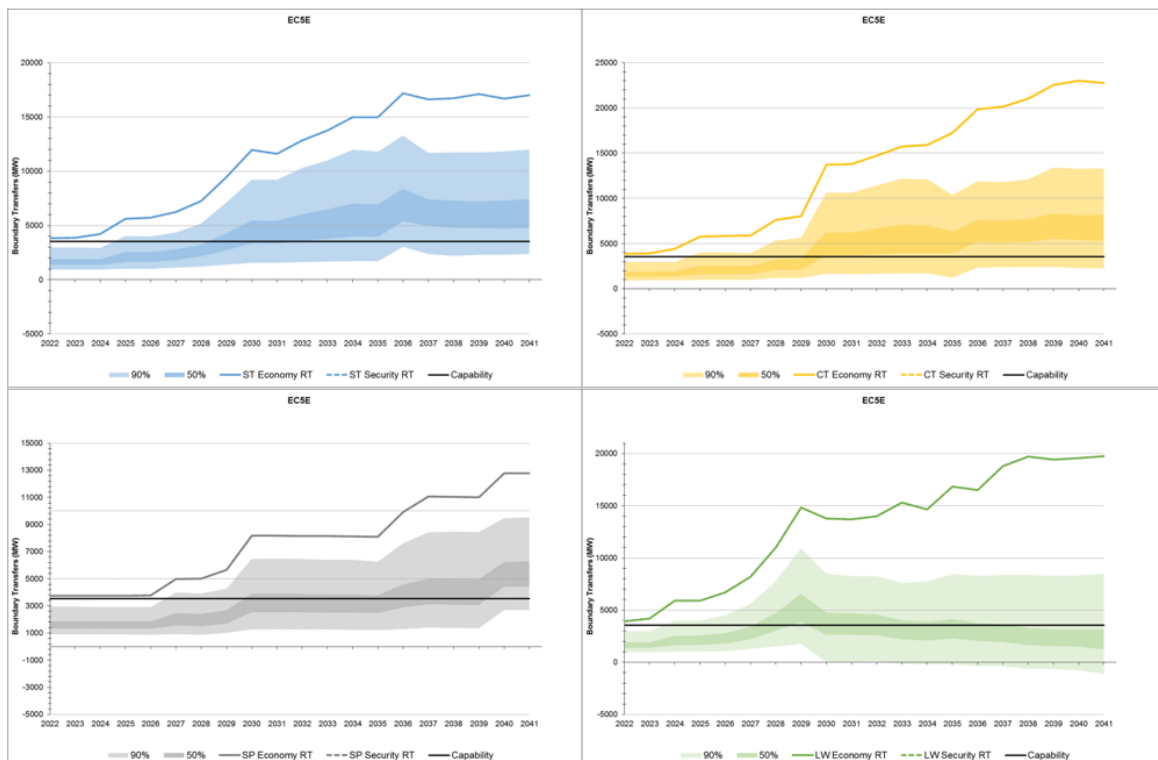
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Specifically relevant to North London, the ETYS shows that the current capability of network boundaries EC5, SC1 and LE1 are unlikely to be sufficient to accommodate the future network requirements. •

2.14 **Figures 5, 6 and 7** below show the boundary transfers expected on boundaries **EC5, LE1** and **SC1** respectively. Each coloured graph reflects a different scenario from the FES (from top left, clockwise): system transformation (blue), consumer transformation (yellow), leading the way (green) and slow progression (grey). On each graph, there are two shaded areas. The darker region shows the range of boundary transfer or power flow forecast across boundary circuits for 50% of the year, and the lighter region shows the range of boundary transfer for 90% of the year respectively.

2.15 The economy and security required transfers are shown in solid and dotted lines. These are calculated using the NETS SQSS guidelines. Where these cross the darker or lighter coloured regions it demonstrates a potential constraint.

Figure 5: boundary transfer for EC5



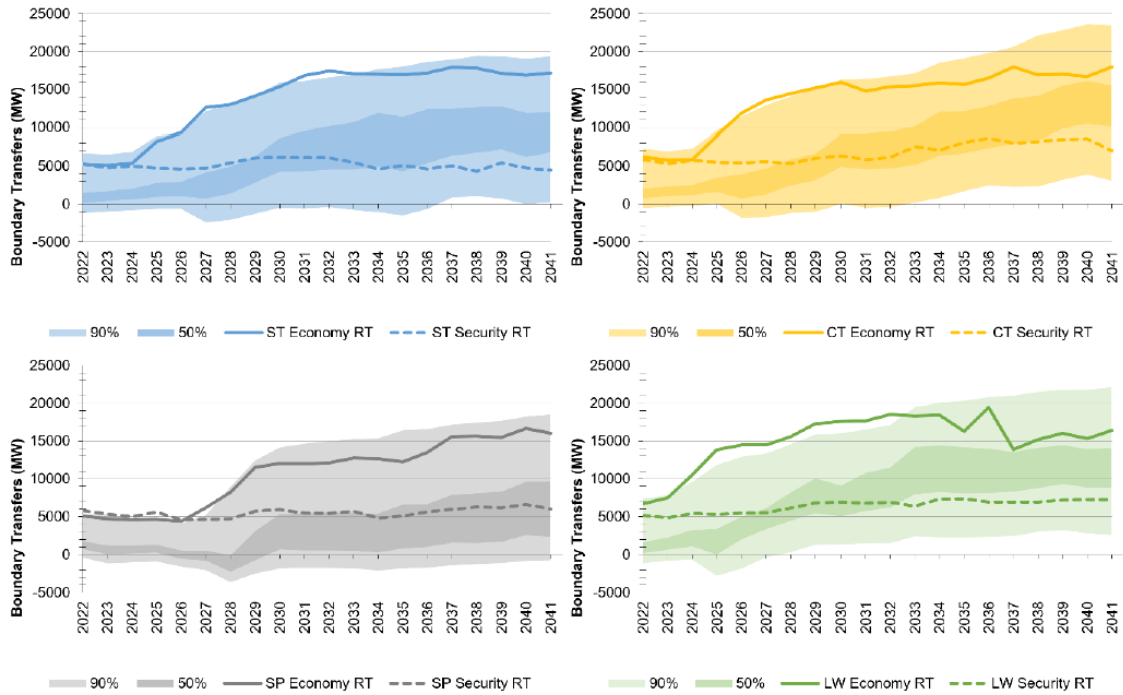
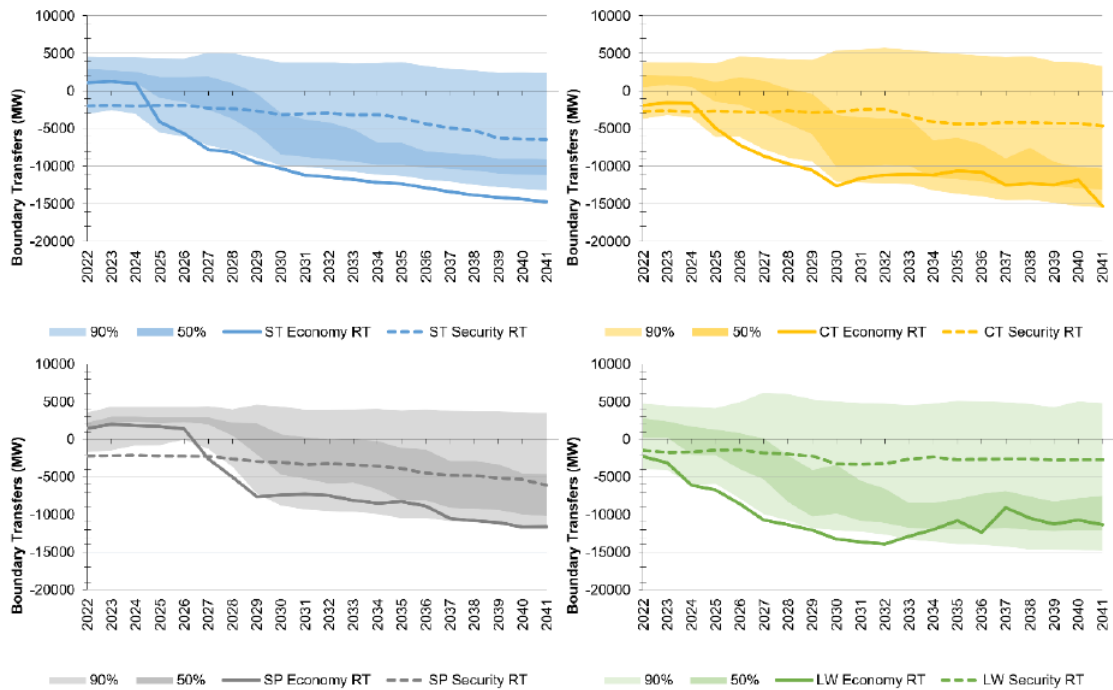


Figure 6: boundary transfer for LE1

Figure 7: boundary transfer for boundary SC1



Options considered

- 2.16 To relieve constraints in South East England, NGET identified a list of potential reinforcement options for NOA assessment. For NOA 2021/22, NGET identified and submitted 13 options for boundary EC5 (import condition), 23 options for boundary EC5 (export condition), 26 options for boundary LE1 and 8 options for boundary SC1. The NOA process returned a 'proceed' signal for the option called HWUP, with an EISD of 2027 in both NOA 2020/21 and NOA 2021/22. Following the development of the HND approach and the July 2022 NOA Refresh, the HWUP has also been identified as an 'HND essential' option²⁸. The HWUP provides additional capacity for all three most relevant boundaries.
- 2.17 Assessment of condition and asset data (outside the NOA process) concluded that a refurbishment of the ZBD route between Waltham Cross and Tottenham substations was also required. This is a **non-load** work with an asset health driver that was identified as a bundling opportunity with HWUP, due to the proximity and interaction with the project, and has therefore also been incorporated by NGET in the scope (but excluded from the estimated costs of the LOTI output).
- 2.18 Asset health drivers have been identified for both the ZBC and ZBD, therefore in the event where the HWUP scheme did not proceed, the ZBC and ZBD routes would still have to be refurbished.
- 2.19 As a follow-up to the NOA proceed recommendation of HWUP, NGET explored and assessed additional credible alternative options to HWUP that could deliver similar system benefits. 13 options were assessed and, following assessment against a range of criteria, a shortlist of seven options including HWUP was taken forward for additional CBA assessment by the ESO.
- 2.20 The reasons for the rejection of five of the 13 options, are summarised below:
- One option based on reconductoring only (ie not uprating to 400kV) was rejected as it would not significantly improve boundary capability;
 - Two options that did not include power flow control, or included alternative/innovative power flow control systems were rejected due to the

²⁸ These are onshore works which are essential to enable the connection of 50GW of offshore wind to the Transmission system by 2030 in line with the governments net zero targets.

Consultation

risk of overloads on the circuit and potential operational issues respectively;
and

- Two options facilitating power flow to the east but not north-south constraints were also rejected.

CBA process

- 2.21 The CBA that was carried out by the ESO to accompany the FNC submission for the North London project, it compares the likely benefits (in terms of reductions in future constraint costs) across the ESO's FES 2021 scenarios versus the costs (in terms of estimated capital costs) of the shortlisted investment options.
- 2.22 For the purposes of this CBA, the counterfactual, also known as the "do nothing" option, was taken as the NOA 2021/22 optimal path without HWUP. This means that all the NOA 2021/22 recommended investments are assumed to be delivered.
- 2.23 The counterfactual option is not assumed as zero cost, as two reinforcements that are within the counterfactual are also assessed within other options. These two reinforcements are the 'Elstree to Sundon 2 circuit turn-in and reconductoring' (SER2) and 'Second Elstree to St John's Wood 400 kV circuit' (ESC1). In the counterfactual, and in all scenarios where they are not explicitly in another year, they are assumed as built in 2029 and the CAPEX values include this. All calculations then use the CAPEX relative to the counterfactual costs.
- 2.24 Table 1 presents the seven shortlisted options tested in the CBA as well as their EISD which is used to show the earliest year a network reinforcement option can be feasibly delivered. A short summary of these options is:
- 2.25 There are three categories of options:
- Variations of the scheme HWUP (options 1 and 5)
 - Separate options to HWUP (options 2, 3, 4 and 6)
 - Sensitivity analysis of HWUP timing with other reinforcements (option 7)

Table 1: Options considered for the CBA

Option	Details	EISD	Scope	Cost (PV) £m (relative to counterfactual option) ²⁹	Cost £m (21/22 prices) ³⁰
0	Counterfactual - No HWUP, background is NOA 2020/21 LW optimal path	SER2+ESC1-2029	Do nothing: 'Elstree to Sundon 2 circuit turn-in and reconductoring' (SER2) and 'Second Elstree to St John's Wood 400 kV circuit' (ESC1) delivered, as recommended by the NOA in 2029 as planned	117 (0)	150
1	HWUP	HWUP – 2027 SER2+ESC1 - 2029	Uprate Hackney, Tottenham and Waltham Cross 275 kV to 400 kV (SER2+ESC2 delivered in 2029, as recommended by the NOA)	357 (241)	440
2	SER2+ESC1 in 2027, and no HWUP	SER2+ESC1 - 2027	'Elstree to Sundon 2 circuit turn-in and reconductoring' and 'Second Elstree to St John's Wood 400 kV circuit' in 2027, instead of 2029.	125 (8)	150
3	WALX-WARL-TILB 400kV upgrade	WALX-WARL-TILB – 2029 SER2+ESC1 - 2029	Uprate Waltham Cross - Warley - Tilbury 275kV to 400kV (SER2+ESC2 delivered in 2029, as recommended by the NOA)	376 (260)	463
4	A collection of smaller options	Small options - 2027 SER2+ESC1 - 2029	Installing a parallel SGT with Elstree SGT6B, 2 new MSCs at Waltham Cross 275kV, two QBs on Pelham to Waltham Cross and cross site cables upgraded at Tottenham. (SER2+ESC2 delivered in 2029, as recommended by the NOA)	181 (64)	228
5	HWUP with a smaller scope (without reconductoring PELH-RYEH-WALX and leaving at 2779MVA or without Pelham QBs)	HWUP – 2027 SER2+ESC1 - 2029	Uprate Hackney, Tottenham and Waltham Cross 275 kV to 400 kV without reconductoring the Pelham to Rye House to Waltham Cross. (SER2+ESC2 delivered in 2029, as recommended by the NOA)	286 (169)	354

²⁹ Capex relative to counterfactual is the cost of the project relative to "do nothing" option (option 0).

³⁰ The difference between PV cost and the cost in 21/22 price base is due to time value of money. The spending profile (ie – timing of spending) of an option will have an impact on the actual value of the money. Option 0 and 2 for example have the same cost but defer in their PV value due to the timing of spending. In option 2 the investment is brought forward 2 years and hence has a higher PV cost.

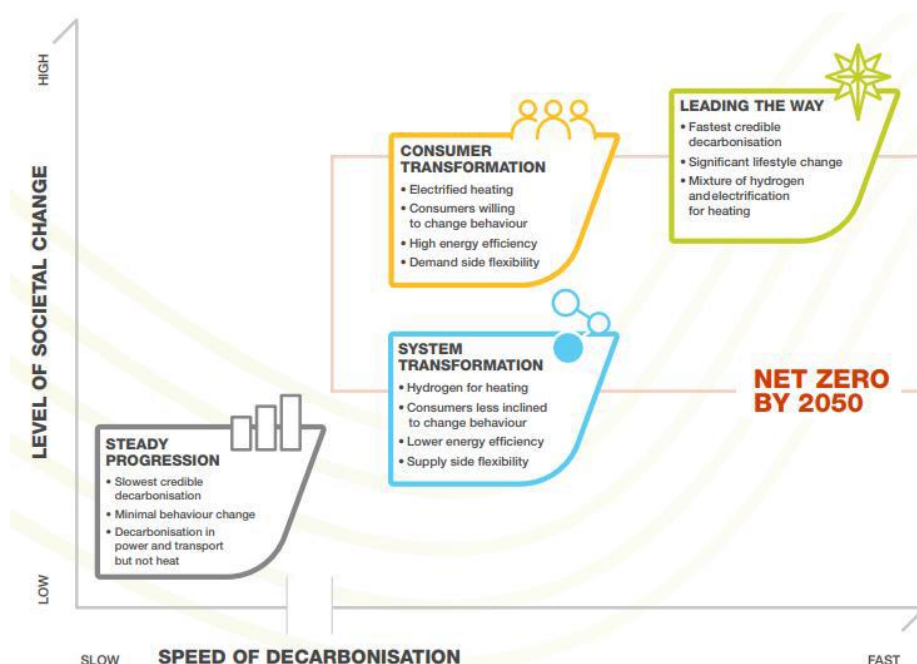
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6	WYMO-WALX New circuit, combined with reduced option 3 and with option 2 delivered in 2027	WYMO- WALX - 2031 SER2+ESC1 – 2029	A new circuit between Wymondley - Waltham Cross, combined with option 2 and a reduced version of option 3 (without Pelham QBS or reconductoring of Pelham to Waltham cross circuits). <i>(SER2+ESC2 delivered in 2029, as recommended by the NOA)</i>	341 (224)	463
7	SER2+ESC1 in 2027, HWUP in 2029	SER2+ESC1 – 2027 HWUP - 2029	'Elstree to Sundon 2 circuit turn- in and reconductoring' and 'Second Elstree to St John's Wood 400 kV circuit' in 2027, with option 1 in 2029	350 (233)	440

CBA results

- 2.26 The CBA compares the Present Value (PV) of the various reinforcement option's CAPEX with the PV of forecasted constraint cost / savings. For each reinforcement option, the PV of both the annual constraint savings and the associated capital cost is calculated; the difference between the two is known as the option's Net Present Value (NPV). This assessment is done for each FES, as for each scenario the constraint savings will defer.
- 2.27 A negative NPV, which is where investment costs exceed the constraint cost savings, implies the investment option may be considered uneconomic on the basis of the LOTI methodology.
- 2.28 The NPVs results range between £0.015bn and £2.54bn across all FES scenarios. Option 1 (HWUP) produces the highest NPV in three out of four scenarios – consumer transformation (CT), system transformation (ST) and leading the way (LW). For slow progression (SP) – the only scenario that does not meet net zero targets – the highest NPV is achieved by progressing option six.
- 2.29 **Figure 8** shows the four FES scenarios used for the CBA.

Figure 8: FES 2021 Scenario framework



2.30 The Least-Worse Regret (LWR) methodology³¹ requires that design preference is based on the option that is least likely to result in an adverse outcome and minimises the risk to consumers across all the FES backgrounds considered. The underlying philosophy is that it is advantageous to pick the solution that has the lowest adverse consequence of being wrong across the range of eventualities, given uncertainties in forecasts and assumptions. This approach seeks to ensure that particularly unfavourable combinations are avoided. It assumes that all eventualities are possible at the investment decision stage. The LWR philosophy can also be seen as risk aversion in the face of an uncertain future that we are not able to place some sort of probability distribution on.

2.31 **Table 2** below shows the CBA results for all options.

³¹ See Network Options Assessment Methodology here: [Network Options Assessment Methodology \(nationalgrideso.com\)](http://nationalgrideso.com)

Consultation

Table 2: CBA results – Least Worst Regrets (LWR)

LWR	CT	LW	SP	ST	Worst Regret	Ranking
Option 01	£0m	£0m	£70m	£0m	£70m	1
Option 02	£1,434m	£1,199m	£0m	£190m	£1,434m	6
Option 03	£749m	£1,310m	£190m	£549m	£1,310m	4
Option 04	£1,124m	£2,073m	£104m	£948m	£2,073m	7
Option 05	£474m	£1,322m	£34m	£478m	£1,322m	5
Option 06	£531m	£1,106m	£93m	£367m	£1,106m	3
Option 07	£107m	£488m	£75m	£107m	£488m	2

2.32 In addition to the CBA results referred to above, various sensitivity analyses were performed by the ESO in line with the requirement set out in section 4.6 of the LOTI guidance. The results are summarised in **Table 3** below. Full results can be found in **Appendix 3**. The sensitivities tested include:

- Impact of delaying HWUP;
- Impact of change in capital costs; and
- Impact of change in constraint costs.

2.33 **Impact of delays:** Delays to HWUP were investigated to see the effect of a delay by one or two years. However, HWUP has outage clashes with another key reinforcement in the southeast – a new 400 kV double circuit between Bramford and Twinstead known as BTNO. A great deal of work was put into NOA 2021/22 to arrange the circuit outages to allow HWUP and BTNO to both be delivered on their EISD's. If HWUP is delayed by a year, it is likely that these reinforcements cannot both be delivered in 2028 due to their outage clashes. Therefore, either HWUP would need to delay by another year to 2029 or BTNO would need to be delayed to 2029 instead. BTNO's current optimal delivery date is 2028. Constraint costs for these delays have been calculated by the ESO to give an idea of the costs involved.

2.34 It is likely that these costs would be greater than estimated, because delays to these two reinforcements would then have knock-on effects and cause outage clashes with other reinforcements in the area, like SER2+ESC1. The delay costs for HWUP are listed in **Table 3** below. As can be seen, with 1 year delay, HWUP would remain the least worst regret option. However, 2 years delay will mean that it is no longer the optimal choice.

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Table 3: regret delay cost

Delay costs	CT	LW	SP	ST	Worst delay cost	Rank
HWUP - No delay	£0m	£0m	£0m	£0m	£0m	1
HWUP - 1year delay	£77m	£132m	£2m	£84m	£132m	1
HWUP - 2year delay	£509m	£1,162m	£72m	£492m	£1,162m	4
HWUP - 1year delay, BTNO - 1year delay	£481m	£1,137m	£73m	£459m	£1,137m	3

2.35 Similar to LWR, a delay will have a different impact depending on the scenario that will eventually materialise. For example, if the scenario of slow progression (SP) would materialise, then the cost of delay would be £2m. However, if leading the way (LW) would materialise, then the additional cost of delay would be £132m. As stated above, it is safe to assume that due to the impact of delay on other projects, the actual cost of delay would be greater.

2.36 **Impact of changes in capital costs:** CAPEX sensitivities of $\pm 20\%$ result in the same preferred option. This means that changes up to $\pm 20\%$ in the capital cost of the options will not change the results of the CBA.

2.37 **Impact of changes to constraint costs:** Constraint cost sensitivities of $\pm 20\%$ result in the same preferred option. This means that changes to cost assumptions which drive the constraint costs i.e. bids and offers, not considering volume of constraints) will not change the result of the CBA.

Our views on the North London project

Project drivers

2.38 We agree with the need for reinforcement on the EC5 and LE1 boundaries to ensure that the electricity generated by anticipated new renewable energy, particularly in Scotland and the east of England (offshore), can be transferred efficiently to where it is needed without being constrained. Demand beyond these boundaries is expected to rise in the future.

2.39 As mentioned, we have not reviewed an INC submission. We however still wanted to ensure that the requirements that are set out in the LOTI guidance document for an INC have been met.

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- 2.40 We have therefore assessed the FNC submission to determine whether NGET has evaluated an appropriate range of options to meet the technical requirement of the project. The next few paragraphs describe this process in which the option proposed by NGET, coded in NOA as HWUP, was determined as the preferred option for the North London project.
- 2.41 To ensure input to CBA that supported the FNC is comparable, Ofgem reviewed whether the cost estimates for each option put forward by NGET were derived using the same assumptions (for example, using the same unit cost for OHL across the options). We also reviewed whether the EISD for each option was justified/explained. This is because both the cost and the EISD have the strongest impact on the CBA.

Options considered.

- 2.42 NGET provided a clear account of the options initially considered, the reasons for rejecting some options and progressing others. We are comfortable that NGET responded to NOA signals in a reasonable way to ensure that appropriate options could be assessed in a timely manner, and it also set out its most realistic delivery dates which is an important factor for this project. Specifically, we considered that NGET made rational judgements on the range of options it considered.
- 2.43 All but one of the options were based on upgrades to the existing system rather than new circuits. The main reason is that new circuits would be generally more costly and will have a later EISD.
- 2.44 We note that NGET also included in their submission proposal to refurbish 13.5km of the ZBD OHL route (between Tottenham and Waltham Cross substations); we also note that this refurbishment was not included in the CBA.
- 2.45 Our view is that NGET has an existing funding route outside the LOTI mechanism which can be used to fund this refurbishment, and thus we don't consider it an integral part of the North London project.
- 2.46 We will continue to engage with NGET on this matter to ensure best result for consumers as we recognise that there may be opportunities related to the delivery of both projects at the same time.

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CBA results

- 2.47 We note that NGET selected a sufficiently broad range of options to be tested in the CBA. This included variations of the scheme HWUP (options 1 and 5), separate options to HWUP (options 2, 3, 4 and 6), and sensitivity analysis of HWUP timing with other reinforcements (option 7).
- 2.48 Our view is that the CBA supports the need for investment on this part of the network and justifies NGET's progression of HWUP as the preferred option. HWUP displays the highest NPV across three FES scenario and represents the LWR option.
- 2.49 We continue to be content that although HWUP is one of the highest capital cost options, it represents the most economic and efficient solution due to its overall constraint cost savings relative to the lower cost options. Given the material impact of EISDs, we expect NGET to continue to progress the North London project in a timely manner to ensure that its benefits are fully realised. Our approach to timely delivery is summarised in **Chapter 4**.
- 2.50 Finally, we are comfortable that HWUP remains the most appropriate option under a reasonable range of tested sensitivities.

Consideration under ASTI arrangements

- 2.51 As explained in our ASTI decision, by including the North London project within the list of ASTI projects, we are accepting the needs case for the project in terms of the technical capabilities reflected in the HND/NOA Refresh. This is not an equivalent level of approval to an FNC approval under LOTI. The needs case approval under ASTI recognises that a lot of the projects within ASTI will continue to evolve and change as they progress through the planning process and see their designs become more detailed too.
- 2.52 The FNC approval under LOTI is designed to specifically come after the design of the project has been finalised and the planning consents secured. Until the ASTI licence condition is in effect, the plan is to make the final decision on the FNC for North London project under the LOTI mechanism.
- 2.53 Once the ASTI arrangements have been implemented into NGET's licence, the project will be subject to ASTI arrangements. As the project has a planning consent in place, we do not expect any changes to NGET's current detailed project design choices. We anticipate that the next stage will be the full ASTI

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project assessment (ASTI PA) for the project. Under the ASTI framework TOs can apply for an ASTI PA at any time after all material planning application consents have been submitted – therefore NGET is able to submit an application for the North London project as soon as the ASTI framework has been implemented in its licence.

- 2.54 As part of the original FNC submission NGET also submitted a Pre-Construction Funding (PCF) request. However, this request was withdrawn in light of the ASTI mechanism incorporating a mechanism to recover PCF costs, which NGET plan to use once the ASTI is established and fully implemented.

3. Delivery via a competition model

Section summary

This chapter summarises our assessment of whether the North London project meets the criteria for competition and explains our minded-to decision on whether to apply a late competition model to North London

Background

- 3.1 Competition in the design and delivery of energy networks is a central aspect of the RIIO-2 price controls. Competition has a key role to play in driving innovative solutions and efficient delivery that can help meet the decarbonisation targets at the lowest cost to consumers. We set out in our Final Determinations³² for RIIO-2 that during the RIIO-2 period, all projects that meet the criteria for competition and are brought forward under an uncertainty mechanism³³ will be considered for potential delivery through a late competition model.
- 3.2 North London project does not meet the criteria for late model competition and thus is not considered for late model competition. This is in line with the ESO view as per NOA 2021/22 Refresh.³⁴
- 3.3 Regardless of the above, in our December 2022 ASTI decision we decided that all projects within the ASTI regime, which includes the North London project, will be exempt³⁵ from consideration for delivery via a competition model. On that basis, we have not assessed the project's suitability for competition under the LOTI regime.
- 3.4 We are seeking to finalise the licence amendments to NGET's licence to implement the ASTI regime later this year.

³² [RIIO-2 Final Determinations](#), Core Document (REVISED), chapter 9

³³ [Large Onshore Transmission Investments \(LOTI\) Re-opener Guidance](#), pages 9-11

³⁴ [Network Options Assessment \(NOA\)](#) - Download the NOA publication (Read NOA 2021/22 Refresh report) - page 32. Please note that the North London project is listed as project HWUP

4. Large project delivery

Section summary

This chapter sets out the large project delivery options for the North London project and our minded-to decision.

Background

- 4.1 In the RIIO-2 Final Determinations,³⁶ we set out our approach to late delivery of large projects (i.e. >£100m). The aim of this approach is to ensure that a network company does not benefit financially from a delay to project delivery.
- 4.2 We aim to ensure consumers are protected from any delay in delivery. To this end, we consider setting a Project Delivery Charge (PDC) for each day a project is delivered late.
- 4.3 In our December 2022 ASTI decision, we decided that all projects within the ASTI regime, which includes the North London project, will be subject to an output delivery incentive³⁷ that rewards / penalises the TOs for delivery against target delivery dates. Based on this, we have not assessed the application of a PDC to the North London project.
- 4.4 We are seeking to finalise licence amendments to NGET's licence in order to implement the ASTI arrangements later this year.

³⁶ [RIIO-2 Final Determinations](#), ET Annex (REVISED), page 32 onwards

³⁷ [Decision on accelerating onshore electricity transmission investment](#), chapter 7, table 10. Please note that the North London project is listed as project HWUP

5. Next steps

Section summary

This chapter sets out the next steps in our assessment of the North London project under the LOTI mechanism.

- 5.1 Our consultation on the positions set out within this document will close on 16 June 2023. We currently anticipate publishing our FNC decision in summer 2023.
- 5.2 Once the FNC stage is complete and a decision has been made, the next phase under the LOTI mechanism will be the PA stage. However, as mentioned above, we anticipate that the next stage for this project will be the ASTI PA stage.

Appendices

Appendix	Name of appendix
1	Privacy notice on consultations
2	Development of North London project: early days
3	CBA sensitivity analysis: full summary

Appendix 1 – Privacy notice on consultations

Personal data

The following explains your rights and gives you the information you are entitled to under the General Data Protection Regulation (GDPR).

Note that this section only refers to your personal data (your name address and anything that could be used to identify you personally) not the content of your response to the consultation.

1. The identity of the controller and contact details of our Data Protection Officer

The Gas and Electricity Markets Authority is the controller, (for ease of reference, "Ofgem"). The Data Protection Officer can be contacted at dpo@ofgem.gov.uk

2. Why we are collecting your personal data

Your personal data is being collected as an essential part of the consultation process, so that we can contact you regarding your response and for statistical purposes. We may also use it to contact you about related matters.

3. Our legal basis for processing your personal data

As a public authority, the GDPR makes provision for Ofgem to process personal data as necessary for the effective performance of a task carried out in the public interest. i.e. a consultation.

4. With whom we will be sharing your personal data

N/A.

5. For how long we will keep your personal data, or criteria used to determine the retention period.

Your personal data will be held for six months after the project is closed.

6. Your rights

The data we are collecting is your personal data, and you have considerable say over what happens to it. You have the right to:

Consultation

- know how we use your personal data
- access your personal data
- have personal data corrected if it is inaccurate or incomplete
- ask us to delete personal data when we no longer need it
- ask us to restrict how we process your data
- get your data from us and re-use it across other services
- object to certain ways we use your data
- be safeguarded against risks where decisions based on your data are taken entirely automatically
- tell us if we can share your information with 3rd parties
- tell us your preferred frequency, content and format of our communications with you
- to lodge a complaint with the independent Information Commissioner (ICO) if you think we are not handling your data fairly or in accordance with the law. You can contact the ICO at <https://ico.org.uk/>, or telephone 0303 123 1113.

7. Your personal data will not be sent overseas.

8. Your personal data will not be used for any automated decision making.

9. Your personal data will be stored in a secure government IT system.

10. More information

For more information on how Ofgem processes your data, click on the link to our "[ofgem privacy promise](#)".

Appendix 2 : Development of North London project: early days

- A2.1 The North London project scope began development in 2009 with the identification of the need to reinforce one of the two routes between Waltham Cross and Hackney following the connection of Scottish Power's Damhead Creek II combined cycle gas turbine (CCGT) project by October 2015, combined with the forecast increase in demand for London. The "North London Reinforcement Project" (NLRP) works were also required to address strategic reinforcement priorities associated with new East Coast offshore wind generation connections, which were originally contracted to complete in 2016/17.
- A2.2 In 2011, a Needs Case document further developed the need for reinforcement, while the subsequent Strategic Options report identified the original NLRP scope as the preferred option. The scope was the upgrading of the OHL route between Waltham Cross and Hackney, including the upgrading and development of the existing substations along the route as follows:
- i) New 400kV GIS substation at Waltham Cross;
 - ii) Upgrading the Tottenham - Brimsdown 275kV 3 and 4 (ZBC) and Hackney - Tottenham 1 and Hackney -Tottenham 1 and 2 (VC) OHL routes from 275kV to 400kV;
 - iii) Replacing two 275/132kV super grid transformers (SGT) at Brimsdown to 400/132kV SGTs;
 - iv) Substation bypass at Tottenham; and
 - v) Replace 275/66kV SGTs at Hackney with 400/66kV SGTs.
- A2.3 This scope was developed and the subject of a DCO application in 2012. However, many of the connection projects that drove the original NLRP subsequently fell away, resulting in a 'Delay' signal from the ESO via the Network Development Process (NDP) from 2013.

Consultation

- A2.4 NGET continued with the DCO to avoid future delays to the project if drivers would reappear and result in need for reinforcement. The DCO was subsequently approved in 2014.
- A2.5 The NOA³⁸ identified the NLRP with the project code of HWUP (Hackney Waltham Cross Upgrade Project), and similar to the NDP recommended it to be delayed.
- A2.6 At this point NGET cancelled any transformer purchases and stood down to minimise further expenditure on the project. Up to this point £21.86m (2009/10 prices) had been spent on development and application for the DCO. To recover these costs, a submission under the Transmission Provisions for Wider Works (TPWW) mechanism was submitted to Ofgem in 2017.
- A2.7 Following assessment Ofgem published its decision³⁹ in October 2018 and allowed the following:
- i) £8.595m allowance through the TPWW mechanism; and
 - ii) The remaining £13.266m was funded through inclusion to the regulatory asset base.

³⁸ Replaced the NDP in 2015/16

³⁹ [assessment_of_request_under_the_transmissionprovisions_for_wider_works_mechanism.pdf \(ofgem.gov.uk\)](https://www.ofgem.gov.uk/consult/condocs/tpww/assessment_of_request_under_the_transmissionprovisions_for_wider_works_mechanism.pdf)

Appendix 3 - CBA sensitivity analysis: summary

HWUP LWR:

LWR	CT	LW	SP	ST	Worst Regret	Ranking
Option 01	£0m	£0m	£70m	£0m	£70m	1
Option 02	£1,434m	£1,199m	£0m	£190m	£1,434m	6
Option 03	£749m	£1,310m	£190m	£549m	£1,310m	4
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Option 05	£474m	£1,322m	£34m	£478m	£1,322m	5
Option 06	£531m	£1,106m	£93m	£367m	£1,106m	3
Option 07	£107m	£488m	£75m	£107m	£488m	2

HWUP delay sensitivity:

Delay cost	CT	LW	SP	ST	Worst Regret	Ranking
HWUP – No delay	£0m	£0m	£0m	£0m	£0m	1
HWUP – 1 year delay	£77m	£132m	£2m	£84m	£132m	2
HWUP – 2 year delay	£509m	£1,162m	£72m	£492m	£1162m	3
HWUP – 1 year delay, BTNO – 1 year delay	£481m	£1,137m	£73m	£459m	£1,137m	4

Capital cost sensitivity summary:

LWR +20% CAPEX costs	CT	LW	SP	ST	Worst Regret	Ranking
Option 01	£0m	£0m	£147m	£0m	£147m	1
Option 02	£1,100m	£1,091m	£0m	£135m	£1,100m	4
Option 03	£714m	£1,308m	£270m	£552m	£1,308m	6
Option 04	£992m	£2,020m	£139m	£908m	£2,020m	7
Option 05	£407m	£1,299m	£94m	£462m	£1,299m	5
Option 06	£303m	£940m	£12m	£211m	£940m	3
Option 07	£106m	£487m	£151m	£106m	£487m	2

Consultation

LWR -20% CAPEX costs	CT	LW	SP	ST	Worst Regret	Ranking
Option 01	£0m	£0m	£78m	£0m	£78m	1
Option 02	£1,194m	£1,185m	£25m	£229m	£1,194m	4
Option 03	£706m	£1,300m	£193m	£544m	£1,300m	5
Option 04	£1,064m	£2,092m	£141m	£980m	£2,092m	7
Option 05	£436m	£1,328m	£54m	£491m	£1,328m	6
Option 06	£361m	£997m	£0m	£268m	£997m	3
Option 07	£109m	£490m	£85m	£109m	£490m	2

Constraint sensitivity summary:

LWR +20% constraint costs	CT	LW	SP	ST	Worst Regret	Ranking
Option 01	£0m	£0m	£99m	£0m	£99m	1
Option 02	£1,424m	£1,413m	£26m	£266m	£1,424m	4
Option 03	£848m	£1,561m	£238m	£654m	£1,561m	5
Option 04	£1,269m	£2,503m	£168m	£1,169m	£2,503m	7
Option 05	£520m	£1,591m	£67m	£586m	£1,591m	6
Option 06	£427m	£1,190m	£0m	£316m	£1,190m	3
Option 07	£130m	£587m	£108m	£130m	£587m	2

LWR -20% constraint costs	CT	LW	SP	ST	Worst Regret	Ranking
Option 01	£0m	£0m	£127m	£0m	£127m	1
Option 02	£871m	£863m	£0m	£99m	£871m	4
Option 03	£572m	£1,047m	£226m	£442m	£1,047m	6
Option 04	£787m	£1,609m	£113m	£719m	£1,609m	7
Option 05	£323m	£1,037m	£82m	£367m	£1,037m	5
Option 06	£237m	£746m	£13m	£163m	£746m	3
Option 07	£84m	£389m	£130m	£84m	£389m	2